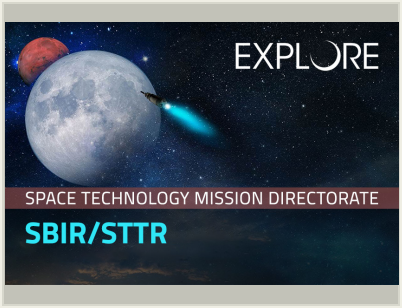
Intelligent Autonomous Aerial Vehicles in the National Airspace, Phase I

Completed Technology Project (2014 - 2014)

Project Introduction

Unmanned aerial systems (UAS) and, in particular, intelligent, autonomous aircraft operating in the National Airspace (NAS) have the potential to significantly impact modern society. They could perform difficult and dangerous tasks such as fire fighting, border patrol, and search and rescue, and dull tasks such as surveying crops. The elimination of a cockpit and the pilots makes UAS operation attractive from an economic standpoint. In addition, much of the technology used for autonomy could benefit manned flight as a pilot's aid to help in tasks such as landing on an oilrig in the high seas. Open questions remain, however, about how unmanned autonomous aerial vehicles can be safely incorporated into the NAS. UAS's operating in the NAS must sense and avoid other vehicles, follow air traffic commands, avoid the terrain and land without operator intervention, react to contingencies, and be reliable and cost-effective. The current approach for UAS integration relies on radio links and the operator's acuity to direct them. Lost links, however, are unavoidable. UAS's must have the capability to make their own decisions based on information available via databases and information discovered by onboard sensors. Near Earth Autonomy proposes to develop technologies and capabilities leading to fully autonomous systems that are able to discover and adapt to unpredicted changes in their environment, and yet still accomplish the mission, with minimal or no human involvement. The proposal focuses on developing autonomy in the form of sensors and computer software that will enable UAS's of the future to operate safely in the NAS. Additionally, the proposal addresses how the technical challenges can be met and how the technology developed can be shown to be both trustworthy and commercially viable for general aviation. This is aligned with NASA's current initiative for safe integration of UASs in the national airspace led by Langley Research Center.



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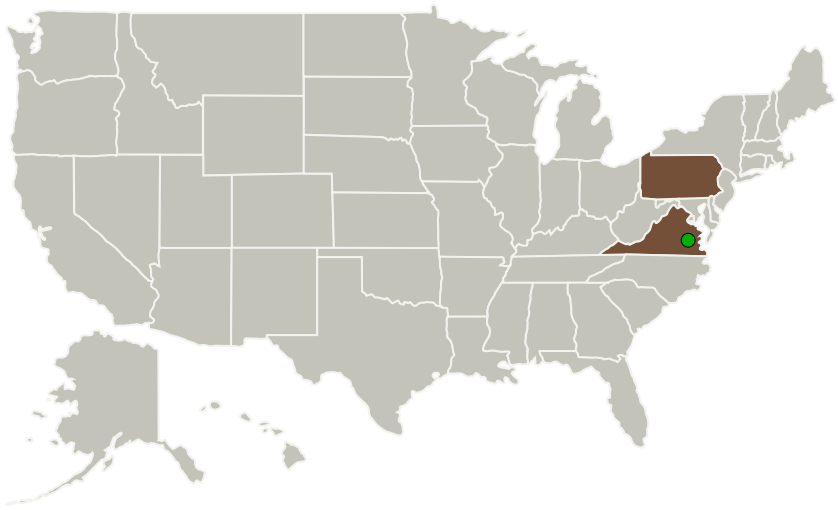
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Near Earth Autonomy, Inc.	Lead Organization	Industry	Pittsburgh, Pennsylvania
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Pennsylvania	Virginia

Project Transitions

June 2014: Project Start

December 2014: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137701)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Near Earth Autonomy, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

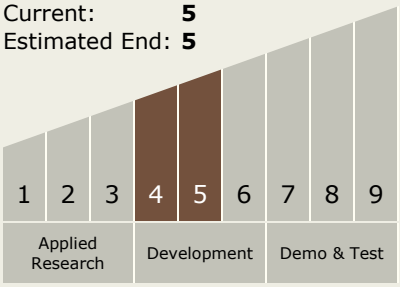
Carlos Torrez

Principal Investigator:

Sanjiv Singh

Technology Maturity (TRL)

Start: **4**
Current: **5**
Estimated End: **5**



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Images

Briefing Chart
Intelligent Autonomous Aerial Vehicles in the National Airspace, Phase I
(https://techport.nasa.gov/image/129752)

Technology Areas

Primary:

- TX02 Flight Computing and Avionics
  - TX02.1 Avionics Component Technologies
    - TX02.1.5 High Performance Field Programmable Gate Arrays

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System